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INTRODUCTION

During the Executive Advisory Group (EAG) review of major FY 78 ADP projects, several management issues were raised. One such issue concerned the rapid computer technology advancements that have resulted in increasingly decentralized ADP applications in the Agency. This has resulted in increasing numbers of personnel performing ADP functions (primarily application design and development) outside of the ODP sub-career service. The EAG review suggests that this trend will continue.

An Agency-wide study (EAG ADP Issue #3 - Centralized and Decentralized Computer Facilities) has questioned whether, given this trend, we should establish common, Agency-wide ADP professional standards for feasibility studies, requirements definition, specification standards, and programming standards.

Because of the broad impact of this issue, the DDCI, in an attachment to a 26 July 1978 memorandum entitled Management of Automatic Data Processing Resources (APPENDIX A), asked that the Deputy Director for Administration formally study the issue and report the findings to him.

Subsequently, the DDA, in a 28 August 1978 memorandum entitled Establishment of Agency-Wide ADP Professional Standards (APPENDIX B), asked the Director of Data Processing to assume overall responsibility for the study and to appoint a chairman. He also asked that each Directorate, the Office of the DCI, the Office of Communications, and the Information Systems Analysis Staff nominate a member to the study group to represent their interests. He suggested that DDS&T nominate two members, one to represent NPIC, the second to represent other offices in the DDS&T. A Task Force was formed in September with ODP, appointed Chairman.

25X1

The other members are:

Ed

25X1A

Bill

Bob

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15 July 1977

(U) This paper is the third in a series of responses to four ADP issues identified by the DDCI in his memorandum to EAG members dated 16 December 1976 that should be addressed by the EAG. The DDCI's goal in identifying the issues was to "take positive steps during the coming year to improve central management of our total ADP program." The first two issues were discussed by the EAG on 31 March and 5 April 1977. Agreement was reached on actions to improve senior management control of the month-to-month use of central services and to improve top management's ability to plan future ADP resource requirements. This paper discusses Issue 3 - that relating to the issue of centralization vs. decentralization of ADP in the Agency. The Issue is stated as follows in the DDCI memo:

"What balance should we be striving to achieve between centralized and decentralized computer facilities? I understand that there are many complex balances involved, including dedicated vs. massive machines, distributed vs. central processing, and decentralized vs. centralized systems development."

(U) This paper approaches this issue by studying three aspects of the centralization/decentralization issue: facilities, professional personnel, and management. It takes stock of the current situation and how we got here, examines the factors bearing on the issue, then reaches some conclusions and provides recommendations for the EAG. The conclusions and recommendations of this paper are summarized in the following paragraphs.

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(U) The Agency currently has a mix of centralized/decentralized ADP facilities which has evolved with little central direction or overall plan. Technology has made the minicomputer an increasingly attractive alternative to the central system and there are pressures to employ more minicomputers in the Agency. Many applications can be better satisfied on a minicomputer system, but case-by-case studies are needed to make this determination. It is likely that decentralized minicomputers will grow in the Agency at a much faster rate than in the past. Large central general purpose computer facilities will continue to be required for the foreseeable future. No specific mix of centralized/decentralized ADP facilities can or should be established by the Agency, but better central planning is needed. Agency policies should not inhibit the growth of minicomputers when they offer a better alternative to the central system.

(U) As more computer facilities are decentralized in the Agency, it is important that more attention be given to maintaining professional standards for ADP personnel who will design and implement both the centralized and decentralized facilities and applications. This is essential if we are to maintain high quality ADP service in the Agency. A study should be conducted on the desirability of an Agency-wide ADP professional career service. Also, a central source of professional ADP advice and assistance should be available to user components that are considering acquiring ADP systems, especially

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minicomputers. User components should also be able to establish their own ADP support groups, if they prefer.

(U) Currently, the Agency does not have any central policy, planning, or management relating to the acquisition of dedicated minicomputer facilities. At the same time, the Agency is under increasing external pressure to speak with one voice on ADP matters to external organizations who are dealing with ADP policy, resource, and management issues. It is essential that the Agency provide a high level central mechanism for policy formulation, planning, and resource control of ADP, and for representing the Agency's interests to these external organizations. This is particularly important if we move toward an increasingly decentralized environment.

(U) In summary, the recommendations are that:

- a. - Minicomputers should continue to be employed by the Agency where they offer a cost/effective alternative to the central system.
- b. Responsibility should be assigned for providing Agency-wide technical support to offices considering ADP systems, especially minicomputers.
- c. Responsibility should be assigned for providing Agency-wide long and short term ADP planning.
- d. Responsibility should be assigned for formulating ADP policy for the Agency and for representing the Agency's ADP interests to external organizations.
- e. Responsibility should be assigned for conducting a feasibility study of an Agency-wide ADP professional career service.
- f. Resources should be provided to fulfill the above responsibilities as assigned.

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DDA 78-2966/2

28 August 1978

MEMORANDUM FOR: Deputy Director of Central Intelligence/
Deputy Director for National Foreign Assessment/
Deputy Director for Science and Technology
Acting Deputy Director for Operations /
Acting Director of Communications /
Chief, Information Systems Analysis Staff,

FROM: John F. Blake
Deputy Director for Administration

SUBJECT: Establishment of Agency-Wide ADP Professional
Standards

REFERENCE: Memo dtd 26 Jul 78 to EAG Members fr DDCI, subj:
Management of Automatic Data Processing Resources

1. Reference memorandum, in its attachment, assigns a responsibility, amongst others, to the Deputy Director for Administration to formally study the following issue:

"establish an. . . common, Agency-wide ADP professional standards (feasibility studies, requirements definition, specification standards, and programming standards to name a few)."

A report on the findings of this study is to be submitted to DDCI by 15 December 1978.

2. I am asking the Director of Data Processing to assume overall responsibility for this study and he will appoint both a chairman for the study group as well as representation from ODP to be members of the group. I now ask that addressees (DDCI for the O/DCI) nominate to the Director of Data Processing a member to the study group to represent their interests. It is suggested that the DOS&T may wish to nominate two members, one specifically to represent NPIC and the other to represent the balance of that Directorate.

3. Because of the somewhat general nature of the tasking, the first endeavors of the study group will be devoted to problem definition and then the establishment of the scope of the study.

4. The same reference memorandum also requested this Directorate to undertake a study on the matter of creating an Agency-wide ADP career service. That responsibility has been assigned to the Office of Personnel. I have asked the Directors of Personnel and Data Processing to assure the maintenance of close liaison because of the interrelationships that exist between the two study topics.

5. Addressees are asked to submit their nominations directly to Mr. Danny May, Director of Data Processing, by 4 September. The group will be convened upon the call of the chairman.

STATINTL

John F. Blake

Att:
Ref memo

cc: D/ODP
Acting D/Pers

STATINTL

Executive Registry

26 JUL 1973

DB/A Regis

78-296

MEMORANDUM FOR: Executive Advisory Group Members

FROM : Deputy Director of Central Intelligence

SUBJECT : Management of Automatic Data Processing Resources

1. (A/IUC) The purpose of this memorandum is to set forth Agency policy with respect to continuing Executive Advisory Group (EAG) involvement in the management of Agency Automatic Data Processing (ADP) resources. In the formulation and prioritization of the Agency's budget, ADP resource requirements should be evaluated within the context of component and directorate responsibilities and should compete with other available component resources (i.e., positions, contractor support, and the like). The EAG's review and management of ADP will therefore be concentrated on Agency-level considerations—utilization of the central ADP facility and the relationship of ODP costs to specific user office missions which directly benefit from these expenditures, long-range planning, and issues relating to the question of centralized/decentralized application of ADP technology.

2. (A/IUC) The EAG will, in conjunction with its review of the Agency's Program Plan each year, specifically focus attention on the proposed functional uses of ADP and on proposed major ADP investments. Included will be reviews of:

a. Component ADP activities which in the aggregate exceed \$250 thousand of component-budgeted resources;

b. New ADP initiatives identified in program plans;

c. Expansion of ODP computing or service capacity;
and

d. The impact of the ZBS ranking process on requested ADP resources.

3. (A/IUC) The EAG will, during the first quarter of each fiscal year, review the planned current-year utilization of the central system (i.e., ODP) and at its discretion, other large ADP activities.

a. The annual review of ODP will consist of examining projects—normally defined as individual user requirements—estimated to consume \$250 thousand of ODP resources in that fiscal year. Users and ODP will jointly present each project in accordance with criteria established by the EAG. This

review will result in an EAG-approved plan for the consumption of ODP resources for the fiscal year that is sensitive both to user needs and to the level of resources that can be committed to the central ADP facility.

b. Concurrent with (a) above, the EAG will review, with ODP assistance, current-year component implementation plans for new ADP initiatives and expanded decentralized ADP capacity, the planning for which was reviewed some 15 months prior (i.e. the program plan). This review will primarily be directed towards changes in requirements and available technological alternatives.

c. The combination of (a) and (b) above are intended to insure that Agency-ADP resources are being applied to those important problems where a high, economically acceptable payoff can be demonstrated or projected.

4. (A/IUO) Any (1) component ADP initiatives or (2) projects supported by ODP that were not included in the fall review described in paragraph 3 that are initially estimated to cost a total of \$250 thousand or more during the first three fiscal years, will require EAG approval prior to initiation. Likewise, ongoing projects not initially estimated to consume \$250 thousand of ODP resources (and, therefore, not reviewed in the fall) will require EAG approval if updated estimates indicate that ODP costs will exceed the review threshold. In each of the above cases, user offices, in coordination with ODP, will submit required data to the Comptroller, who will arrange for EAG review. User offices will be guided by the instructions contained in annual ADP guidance memoranda.

5. (A/IUO) Each year following the EAG's review of current-year ADP programs, an appropriate guidance memorandum will be issued. Attached is such guidance for Fiscal Year 1978.

6. (A/IUO) The policies established herein are intended to ensure that senior Agency management remains positively involved in ADP matters, both as a sound management practice and to assure external reviewers that our utilization of requested ADP resources is necessary, beneficial, and firmly under control.

/s/ Frank C. Carlucci

Frank C. Carlucci

Attachment:
As Stated

Attachment to EAG Memorandum Concerning the Management of Automatic
Data Processing Resources

Subject: FY 1978 Review of Major ADP Projects and Issues

1. (A/IUO) The purpose of this guidance is to record decisions made by the EAG in its review of major ADP projects supported by the Office of Data Processing (ODP) in FY 1978 and to address other related ADP management issues.

2. (A/IUO) All projects reviewed are approved and ODP will support them in FY 1978 to the extent indicated during the individual project reviews. ODP will monitor the costs incurred within ODP for each project and will concurrently notify the user office and the Comptroller when incurred costs reach 75 percent of the approval level. User offices will be responsible for validating their project requirements for the remainder of the fiscal year. If increased requirements result in ODP costs projected to exceed the approval level by more than 10 percent, user offices in coordination with ODP will provide to the Comptroller, within ten working days of the ODP notification, justification for continued fiscal year ODP support. The justification will include:

--an explanation of the need for increased ODP services;

--a new projection of the cost of ODP services required for the remainder of the fiscal year; and

--a statement addressing the availability of ODP resources to provide the increased services and the impact on the user organization if the increase is not approved.

The Comptroller will arrange for EAG review of the increased funding request.

3. (A/IUO) ODP will concurrently inform the Comptroller and user offices in all instances where ongoing ODP-supported FY 1978 projects, not previously reviewed by the EAG, are estimated to grow to \$250 thousand or more. The user office, in coordination with ODP, will provide to the Comptroller, within ten working days of notification, a completed Project Decision Form. The Comptroller will arrange for EAG review of the project.

4. (A/IUO) New FY 1978 ADP projects estimated to consume \$250 thousand or more of ODP resources through FY 1980 will require EAG approval prior to initiation. The user office, in coordination with ODP, will submit a completed Project Decision Form to the Comptroller, who will arrange for EAG review of the project proposal.

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5. (A/IOO) During this EAG review process, several management issues were raised. One such issue concerned the rapid computer technology advancements that have resulted in increasingly decentralized ADP applications in the Agency. This has resulted in increasing numbers of personnel performing ADP responsibilities (application design and development primarily) outside of the ODP sub-career service. Every available indication suggests that this trend will continue. An Agency-wide study has questioned whether, given this trend, we should establish an Agency-wide ADP career service and common, Agency-wide ADP professional standards (feasibility studies, requirements definition, specification standards, and programming standards to name a few). Advantages suggested are uniformity, career mobility throughout the Agency, and comparable advancement opportunities for all ADP professionals. Because of the broad impact of this issue, I am asking that the Deputy Director for Administration formally study these issues and submit a report of his findings to me by 15 December 1978. I would like the report to include a full discussion of:

- the pros and cons of each specific issue;
- alternative solutions and the manner in which each would be implemented and maintained, if approved;
- the definition of an "ADP professional" and the approximate number of Agency personnel that would, if approved, be included in an expanded ADP career service;
- the impact on Agency components with "resident" ADP professionals and ongoing ADP programs; and
- conclusions reached and recommendations offered.

6. (A/IOO) Another issue raised during this review process was the need for a formal, long-range Agency ADP plan. There is some sentiment for this within the Intelligence Community but specific requirements for such a plan have not as yet crystalized. We will give more attention to this issue as future needs dictate.

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ESTABLISHMENT OF AGENCY-WIDE ADP PROFESSIONAL STANDARDS

UNCLASSIFIED UPON REMOVAL OF
APPENDIX F AND PAGES 3 AND 9.

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ESTABLISHMENT OF AGENCY-WIDE ADP PROFESSIONAL STANDARDS

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EXECUTIVE SUMMARY

In the DDCI memorandum dated 26 July 1978, subject: Management of Automatic Data Processing Resources (APPENDIX A), the DDA was asked to study the need for Agency-wide ADP professional standards. Specific areas mentioned were "feasibility studies, requirements definition, specification standards, and programming standards". As a result, an inter-Agency Task Force was formed with representatives from the major providers of ADP services in CIA - the Office of Data Processing, Office of Central Reference, Office of Communications, Office of Development and Engineering, the DDO's Information Management Staff, the National Photographic Interpretation Center, and the DDA's Information Systems Analysis Staff.

The organizations represented on this Task Force are responsible for much of the development and maintenance of computer software in CIA. This software is defined as the computer programs, together with data files and descriptive manuals, that are developed to make computer hardware perform useful services. The process of developing this software is called the Software Engineering Cycle. The cycle starts when a user requirement is identified as a potential computer application and continues through the development and maintenance of the software. The product of this cycle is referred to as an ADP system.

During initial Task Force meetings, the members discussed how the software development process occurs in their own offices. While each organization has its own methodology, it is apparent that there are very strong reasons for having one Agency-wide standard for software development. Some of these reasons include:

- Helping to ensure that the proper analysis of the ADP system is performed for management review;
- Facilitating better communications between the various software development groups that have joint responsibilities on the same systems;
- Providing consistent terminology for users who receive support from several of the components;
- Providing a uniform approach for the development of proposals for contractor supplied software; and
- Providing software engineering training to all software development groups in CIA. This training would be focused toward the methodology developed as CIA standards for software development evolve.

The scope of these standards could eventually include all software that the Agency uses - generated both internally and externally. The positive results that come from one Agency-wide standard could eventually apply to all parts of the Software Engineering Cycle.

The Task Force studied all aspects of the cycle, and chose to focus attention on the first phase of this process - the Definition Phase. We chose to concentrate our efforts on the Definition Phase because it is the most significant phase in the cycle. During this phase, the user and computer organizations conduct a series of dialogues which eventually

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result in a comprehensive and formal definition of the user requirement. This requirement definition is used as the basis for subsequent software development.

In looking for a mechanism to continue the work of the Task Force, we concluded that an Agency-wide ADP standards committee is the only viable solution. The committee approach would ensure that the unique interests of the various Agency components involved in software development are recognized and coordinated. The exercise of preparing the proposed standard for the Definition Phase by this Task Force convinced us that the committee approach is sound. The committee should issue these initial standards, periodically review and update these standards, and issue new ones for other aspects of the Software Engineering Cycle. The managers and computer specialists who use the standards should be encouraged to suggest changes. The standards will quickly go into disuse without a review mechanism. The recommended ADP standards committee would provide the means to enact needed changes.

In summary, the recommendations of the Task Force are that:

1. The Director of Data Processing be directed to establish a permanent Agency-wide committee to develop, coordinate, and promulgate Agency-wide ADP software engineering standards covering the development of computer systems.
2. As the initial step, this committee undertake the development and publication of a standard covering the Definition Phase of the Software Engineering Cycle. An initial draft of such a standard, prepared by the Task Force, is attached as APPENDIX D.
3. The committee then undertake to prepare a plan to examine the feasibility of adopting standards for other phases of the Software Engineering Cycle.

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INTRODUCTION

During the Executive Advisory Group (EAG) review of major FY 78 ADP projects, several management issues were raised. One such issue concerned the rapid computer technology advancements that have resulted in increasingly decentralized ADP applications in the Agency. This has resulted in increasing numbers of personnel performing ADP functions (primarily application design and development) outside of the ODP sub-career service. The EAG review suggests that this trend will continue.

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Because of the broad impact of this issue, the DDCI, in an attachment to a 26 July 1978 memorandum entitled Management of Automatic Data Processing Resources (APPENDIX A), asked that the Deputy Director for Administration formally study the issue and report the findings to him.

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(C)

, DDS&T

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BACKGROUND

Since the introduction of general purpose computers in the late 1950's, the CIA has been an active proponent of data processing. The Agency is in the business of collecting, analyzing, and producing information, and the computer was well suited to assist in all these areas. As the requirements for computer assistance surfaced, computer programmers designed systems to satisfy those requirements.

During this evolutionary process, several Agency components developed their own expertise where there was a heavy and continuing need for data processing. The most notable examples of this are NPIC, DDO, OCR, OC, and OD&E. This continues today and is an attractive arrangement for these functional managers. Familiarization with individual systems is a key point for efficiently performing maintenance and developing small projects. Since these resources are dedicated to the organization, the manager can adjust the resources and priorities to suit the needs of the office. The computer specialists are familiar with their respective office requirements and the chance of a major misunderstanding of user requirements is reduced.

At the same time that several users were developing their own cadre of specialists, ODP was established to provide ADP support to all CIA components. This support continues and ranges from highly scientific design and programming to business data processing. ODP customers include all the Directorates and the Intelligence Community. In addition to this central support, ODP currently has 20 officers on rotation in Agency components developing computer software. The user office supplies the ceiling position, and ODP in turn supplies qualified personnel on a two-year rotational assignment. ODP officers are currently assigned in the DDA, DDS&T, NFAC, and the Collection Tasking Staff.

The Task Force members who produced this paper represent the major organizations in CIA responsible for software development. Each of the organizations has developed its own set of documentation standards. While there is a difference in the terminology, format, and timing of such documentation, the various organizations have long recognized the necessity of documentation. APPENDIX F contains a table of the current number of professional staff and contractor personnel in each organization.

Computer software development, also referred to as the Software Engineering Cycle, is composed of five phases: Definition, Design, Programming, Testing, and Operation. A description of each phase is contained in APPENDIX C. The discussion in the remainder of this study refers to the development of standards for these five phases.

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DISCUSSION

BENEFITS OF STANDARDIZATION:

The effective management of software development demands discipline. Discipline helps to ensure that computer programs are developed on time, within budget, and that they perform as required. The methodologies of software engineering have been developed over the last 10 years and continue to evolve. The common thread throughout the literature is the plea for identifiable phases in the development of a software product, and for control over the method that programmers use to implement a system.

The members of the Task Force are sensitive to these concerns and, as managers of large software development components, recognize the value of standards. In fact, within their respective components, published software development standards have been promulgated. The discussion here does not address itself to the use of standards in the development of software, but rather to the value of Agency-wide standards.

The need for Agency-wide software standards is supported by the need to encourage a uniform approach to the Software Engineering Cycle. Such standards would:

- a. Ensure that the proper analysis and review is performed so that appropriate Agency managers can be made aware of the scope and magnitude of new ADP systems;
- b. Allow better communications between the various software development groups in the CIA;
- c. Provide a consistent set of terminology and procedures to users who receive support from several of these groups;
- d. Provide a framework for the development of software which is easier to maintain; and
- e. Provide a uniform and approved approach for the development of the statements of work necessary in acquiring contractor supplied software.

Uniform, Agency-wide software development standards should facilitate more effective management review of these activities - before, during, and after development. In addition, they would allow better communications between software development groups. This would provide the Agency with a pool of highly skilled technical people who would be able to interact more easily. The benefits of this enhanced communication would be evident when:

- a. Technical experts in one component participate in the technical review of another component's project.
- b. Components which have portions of a larger system are able to interact with each other more efficiently since both

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would be developing their respective portions using the same standards.

c. Technical personnel are rotated between ADP components.

Finally, if all ADP organizations use common criteria for analyzing and documenting software definition, very specific training courses could be designed to develop our personnel. While CIA sends software personnel to various external training courses, these courses are never directly related to our methodology. These specific courses would result in better designed software through more appropriately trained software technicians.

SCOPE OF PROPOSED STANDARDS:

The potential scope of these standards includes all the phases of the Software Engineering Cycle. These are the Definition, Design, Programming, Testing, and Operation phases. A description of each is described in APPENDIX C. The Task Force feels that if uniform standards were developed for all of these phases, it would help ensure that the software developed would be more responsive to user requirements, be developed on time and within budget, and require a minimum of effort to maintain during its life cycle.

Currently there are three methods by which software is developed in CIA: (1) by the dedicated software development groups represented on the Task Force; (2) by Agency individuals who are involved in the development of computer software but are not part of one of the groups represented above; and (3) by external contractors. For an Agency standards program to be most effective, all three methods of software development should conform to these standards.

FIRST PRIORITY STANDARDS:

In view of the potential scope of developing Agency-wide data processing standards, the Task Force agreed to address the most critical of these phases in detail - the Definition Phase. The documentation produced during the Definition Phase forms the foundation of the subsequent phases. Without this initial effort, the development of the software is not likely to be smooth. This phase is of primary concern because manpower and dollar resources are allocated at this time. Of equal importance, all Agency components can follow the Definition Phase standards regardless of the hardware and software that is used. The Task Force has developed an initial draft of the standards for the Definition Phase, and included it as APPENDIX D.

NEED FOR STANDING COMMITTEE:

Issuing standards is not a one-shot affair. They must be reviewed on a continuous basis and updated as needed. The users of the standards must be encouraged to review them critically and suggest changes. An Agency-wide committee composed of the major application organizations and the four

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Directorate ADP Control Officers in CIA should be formed to address the required standards for all phases of the Software Engineering Cycle. This committee would be responsible for:

- Formally issuing software engineering standards
- Periodically reviewing these standards
- Investigating the need for other standards

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CONCLUSIONS

Based on the above discussion, the Task Force concluded that there are significant advantages to be gained from adopting Agency-wide ADP software engineering standards covering various phases of the Software Engineering Cycle. A permanent Agency-wide committee should be formed to develop, coordinate, and publish these standards. The committee will ensure that the unique interests of the various Agency components involved in software development are recognized and coordinated. These standards could eventually cover all software written both within CIA and by outside contractors.

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RECOMMENDATIONS

The members of the this Task Force whose signatures appear below, concur with the following recommendations:

1. The Director of Data Processing be directed to establish a permanent Agency-wide committee to develop, coordinate, and promulgate Agency-wide ADP software engineering standards covering development of computer software.

2. As the initial step, this committee undertake the development and publication of a standard covering the Definition Phase. An initial draft of such a standard, prepared by the Task Force, is included as Appendix D.

3. This committee should then prepare a plan to examine the feasibility of adopting standards for other phases of the Software Engineering Cycle.



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